AMENDMENTS TO THE DRAWINGS

Please replace sheets 1-3 with the attached Replacement Sheet 1-3.

REMARKS

Claims 1-6 are pending and remain for consideration. Claims 1, 5 and 6 are amended herein.

The informal drawings are objected to. Applicant is submitting with this Response formal drawings. It is therefore respectfully submitted that the objection to the drawings is overcome.

The Examiner has requested that an Information Disclosure Statement be filed pertaining to the references listed in the specification. An Information Disclosure Statement was filed on September 8, 2006 to address this objection.

Claims 1-6 are rejected under 35 U.S.C. § 112, second paragraph as allegedly being indefinite. The rejection is traversed and reconsideration is respectfully requested, particularly in view of the clarifying amendments to the claims.

Claim 1 is amended to clarify antecedent basis and to clarify that the combustion chamber of a heating system is recited with regard to environment of operation of the claimed control system, but is not intended to be a claimed element.

Claim 1 is also amended to clarify the function of each claimed element with regard to sensing and manipulating signals indicative of the quality of the combustion flame including carbon dioxide content. It is therefore respectfully submitted that the § 112, second paragraph rejection of claims 1-6 is overcome.

Claims 1-6 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Allen et al. (U.S. Patent No. 5,249,954) in view of Newberry (U.S. Patent No. 5,277,575). The rejection is traversed and reconsideration is respectfully requested, particularly in view of the clarifying amendments to the claims.

Allen et al. is directed to an integrated imaging sensor/neural network controller for combustion control systems. The controller uses electronic imaging sensing of chemiluminescence from a combustion system, combined with neural network image processing, to sensitively identify and control a complex combustion system. According to the Abstract, the imaging system used is not adversely

affected by the normal emissions variations caused by changes in burner load and flame position. By incorporating neural networks to learn emission patterns associated with combustor performance, control using image technology is fast enough to be used in a real time, closed loop control system. This advance in sensing and control strategy allows use of the spatial distribution of important parameters in the combustion system in identifying the overall operation condition of a given combustor and in formulating a control response accorded to a predetermined control model.

Allen et al. mentions a flame sensor consisting of a UV-visible image intensifier coupled to a 512X240 element CCD array to provide combustion information to control the fuel air ratio and achieve optimal flame quality. However, Allen et al. does not teach or suggest a control system for a heating system having components configured such that the characteristics of UV light of the combustion flame are used to indicate the carbon dioxide content, and that such carbon dioxide content is used to track changes in the flame quality from an initial setup optimal value, as is generally recited in amended claim 1 of the present application. Rather, Allen et al. employs the images from the CCD camera to examine flow turbulence as an indicator of flame quality. More specifically, Allen et al. states at col. 6, lines 29-53:

> Encoded within the spatial distribution of these images are the overall level of turbulence in the flame, the penetration of the fuel spray, and the degree of atomization of the fuel jet. The images from the CCD camera provide sufficient combustion information to reliably control the fuel air ratio and achieve optimal flame quality. The camera itself is capable of sampling the combustion system at rates up to 60 Hz. Each sample is time-gated to about 30 μs, providing a temporally "frozen" snapshot of the turbulent flame. The total bandwidth of the control system, therefore, is limited to 60 Hz, although

the time-resolved images provide a spatial record of the temporal fluctuations across the flame at much higher bandwidths. A principal distinguishing characteristic of the flame quality is the spatial scale sizes associated with the flow turbulence. These scales are frozen in the image but represent the effect of temporal fluctuations in the range of several Khz. This high frequency information is available in the image because of the high-speed gating used. The typical gates of 30 μs used here permit temporal resolution of fluctuations within the image up to approximately 33 kHz. Higher frequencies could be achieved using a faster intensifier gate, although the present frequency range is sufficient for boiler applications.

In sum, Allen et al. employs a high speed camera to analyze flow turbulence to determine and control flame quality. Allen et al. only mentions carbon dioxide in the background section wherein carbon dioxide or other gases are directly measured. However, Allen et al. does not teach or suggest a control system employing the characteristics of UV light to indicate carbon dioxide content, as is generally recited in claim 1 of the present application.

Newberry (U.S. Patent No. 5,277,575) is directed to an electronic control system for controlling the operation of an oil burner heating system. The control system comprises a relay circuit having first and second relays. When the relays are closed, an external power source is connected to an igniter and motor. The control system also comprises a relay contact monitor configured to detect whether the relays contacts are welded. The control system also comprises a relay control circuit adapted to energize the relays in response to the call for heat from the thermostat and a signal from the relay contact monitor indicative that the relay contacts are not welded. The relays are configured such that only one relay will open or close with power across its contacts. The control system further comprises an improved flame

sense monitor adapted to quickly output signals indicative of flame or no flame when such conditions are present with sensitivity hysteresis and a feature to adjust such hysteresis. The Examiner cites Newberry for mentioning a thermostat included in a control system.

Newberry adds nothing to Allen et al. with regard to teaching or suggesting a control system having components configured such that the characteristics of UV light of the combustion flame are used to indicate the carbon dioxide content, and that such carbon dioxide content is used to track changes in the flame quality from an initial setup optimal value, as is generally recited in amended claim 1 of the present application. In fact, Newberry does not even mention the term "carbon dioxide."

In summary, Allen et al. taken either alone or in combination with Newberry does not teach or suggest a control system employing UV characteristics to indicate carbon dioxide content, as is generally recited in amended claim 1 of the present application. Moreover, claims 2-6 each ultimately depend from and thereby incorporate the limitations of claim 1. Accordingly, claims 2-6 are unobvious for at least the reasons set forth for claim 1.

In view of the foregoing, it is respectfully submitted that amended claims 1-6 are in condition for allowance. All issues raised by the Examiner having been addressed, an early action to that effect is earnestly solicited.

No fees or deficiencies in fees are believed to be owed. However, authorization is hereby given to charge our Deposit Account No. 13-0235 in the event any such fees are owed.

Respectfully submitted,

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